Study of Lane Discipline and Its Effects: A Review

Milan M.Trivedi[1] , Prof. V.R.Gor[2]

P.G Student, Transportation Engineering. G.E.C. MODASA . [1]

Assistant Professor Civil Engineering Dept. G.E.C. MODASA [2]

_____

Abstract— **Traffic Flow at urban centers indicates variation in actual Traffic behavior Capacity on link, at intersections and on crossing. Lane discipline causes Delay and consequent changes in Approach speed, lateral movement, lateral acceleration and lateral gap at major city road network. For safe and capable movement of large volumes of traffic on city road network, intersections, crossings, the lane discipline is important. The proposed capacity and operation of traffic significantly depend on driver behavior, lane discipline, traffic flow characteristics, etc. The lane discipline not followed on urban roads in India leads to heterogeneous motorized traffic, slow-moving traffic and pedestrians. It is consequently required to consider suitably traffic flow parameter speed, density, and delay influence by lane discipline for mixed traffic situation to estimate at major city road network. This paper represents the review of literatures based on lane discipline and its effects on various spots in urban roads for mixed traffic behavior.**

Index Terms— **Lane Discipline, traffic flow characteristics, dispersion time**

_____

1. INTRODUCTION

India is a developing country and its cities are undergoing rapid urbanization and improvement as a result there is high development in the road traffic. Traffic improvement in India is very tricky due to the heterogeneous traffic stream distribution the similar carriageway. Also in spite of having lane markings, mainly the lane discipline is not followed frequently at intersections, city road network, level crossing etc. Railway traffic as well as road traffic is growing rapidly in urban and suburban areas.

Lane discipline revenue choosing the correct lane at the suitable time and – to a definite level – staying in that lane. If road markings or road signs designate which lanes to use head off in definite directions and wait until the last second to change, then it is responsible of poor lane discipline. If overlap lanes or meander out of lane then it is also guilty. It could be distinct for poor planning, usual driving position, observation/safety, and reaction to traffic signs/markings, and so on. traffic lights frequently find that the road splits into two lanes, then merges reverse into one just after. It happens where there is a junction and crossing, and its function is to avoid people being seized up by those who are turning. It is efficiently an overtaking lane intended to maintain traffic flowing. Lanes are distinct on the road to facilitate direct traffic and to make best use of the road space. Lane discipline revenue using the correct lane for where we're going and consequent the lane markings. It helps to avoid congestion and keeps traffic flowing safely, particularly where traffic is heavy.

The differences that make different heterogeneous traffic systems from that of homogeneous traffic are mainly due to the broad divergence in the operating and performance individuality of vehicles. The distinction between lane based homogeneous and non-lane based heterogeneous (non-homogeneous) traffic.

*Homogeneous traffic:
  -Lane-following
  -Disciplined movement
*Heterogeneous traffic:
  -Highly changeable static and dynamic   characteristics
  -Difficult to impose lane discipline
  -Vehicles dwell in any lateral position on the accessible road space

Traffic police will extract the lane discipline rule even though protests from private bus operators and motorists' protest. It is accurate that the routine of the convention had slowed down traffic flow, but motorists understood to be disciplined while most private bus and three-wheel drivers now keep away from zigzagging from lane to lane.

As vehicle drive alongside it must to adjust the position of vehicle in virtual to the kerb and the Centre of the road or within the lines of a distinct lane. When faced with several lanes or wide roads it is need to conclude which lane to take or how best to location the vehicle correspondingly.
Lane discipline has following scenario:
-Vehicles are placed in such a way that centre line of the vehicle and centre line of the lane should be match.
-Overtaking is allowed but movements between lanes are not allowed.
-Vehicles are allowed to overtake from right but not from left.
(Source: As Per RTO Governmentorderno.TRD.309.SAEPA.2006dated, 29.10.2007, section 190 clauses 119).

By investigative the example of lane discipline at intersection shown in Figure, an accepting can be gain of the "lane discipline" mandatory for safe operation. In this example, three of the four legs of intersection have multiple-lane approaches. Greatly a signalized intersection, pavement arrows demonstrate the acceptable movements that can be completed from a specified lane. It wouldn't think of going straight from a left turn simply lane at a signalized intersection, recognizable with multi-lane intersection wouldn't think of exiting the way around the roundabout if they entered the roundabout via a lane containing a left

turn pavement arrow. Observe how the number of getting lanes on every leg should be compatible with the pavement arrow designation on all other approaches. (Drivingtesttips.biz, August13, 2000)
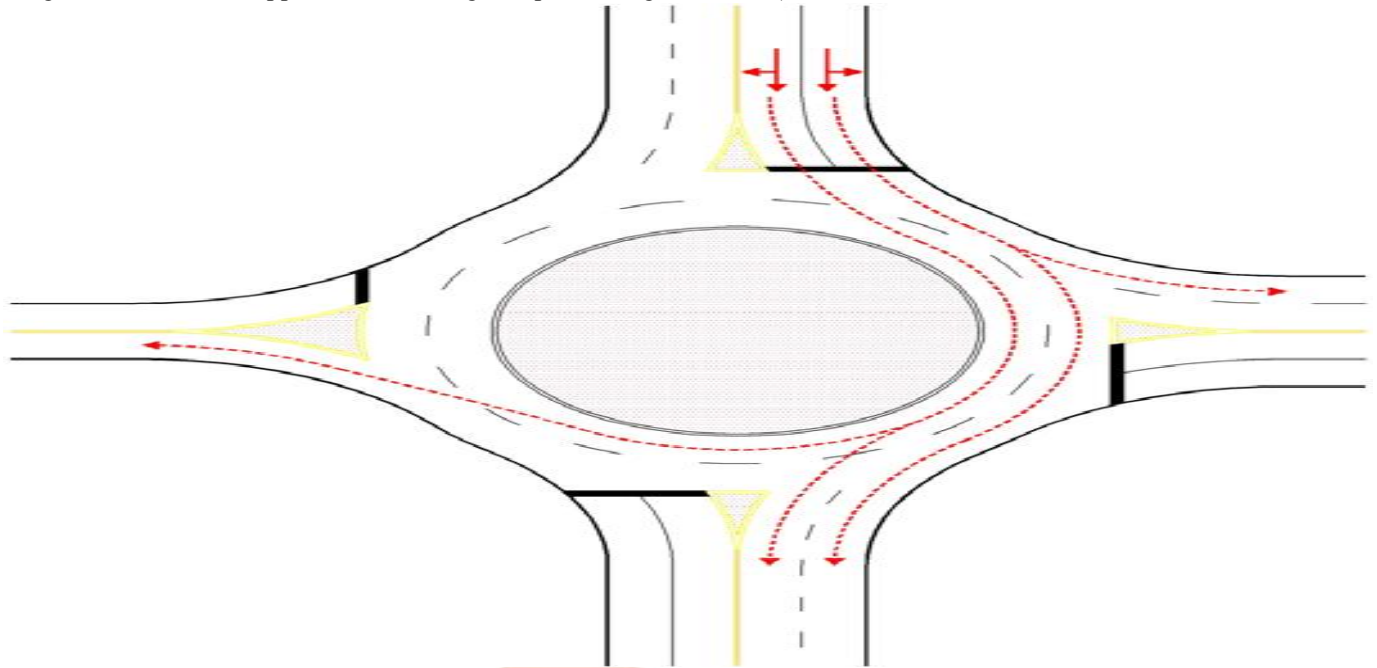

Figure: Image of an example of lane discipline at intersection

2. LITERATURE REVIEW

The lateral movement of the vehicles is very high due to lane discipline. Lateral acceleration is one of the most important vehicle dynamic variables. To study the lateral movement of the vehicle in case of straight road section to know the vehicles are following lane discipline or not. They observe the lateral acceleration; speed values in the moderate traffic conditions and to investigate the relationship between the vehicles longitude speeds with the lateral characteristics. (Geetimukta et al., 2013)

To quantify the unaccounted parameters of heterogeneity for Indian traffic into the existing car-following models to form a modified car-following model. A simulation model has been developed as a software program to study the performance of the modified car-following model and they carried out for roadway traffic characteristics, distribution of vehicles along roadway width and speed distribution of vehicles. (Mahendrakumar et al., 2016)

Vehicular traffic is heterogeneous and do not follow lane discipline and can move anyplace on the available free space of the road. Lateral gaps maintained by the vehicles play major role in the passing/overtaking behavior of the following vehicles. Detailed understanding of the lateral gap maintains behavior huge data, covering various traffic scenarios. Speed of the subject vehicle and type of the adjacent vehicle, and road width, were found to be significantly influencing the lane discipline. (Budde et al., 2013)

Speed-density relations play a main role in dynamic macroscopic modeling and these relations are also used for estimating the other important macroscopic relations. Appropriate speed-density data with respect to heterogeneous traffic stream are using the field observations. Green shields linear speed-density model has been utilized for understanding the issues related to the parameter estimation. (syed et al., 2016)

Lane-changing behavior, as one of the most challenging driving maneuvers to understand the lane discipline, and a major source of collisions, can benefit from this additional information. Lane-changing model based on a calibration approach based on the method of simulated moments is presented and a simplified version of the proposed framework is calibrated against NGSIM software data. The prediction capability of the simplified model is validated and concluded the presented framework is capable of predicting lane-changing behavior. (Alireza et al., 2015)

Free-flow speed (FFS) is the speed of vehicles under low volume conditions, when the drivers be liable to drive at their desired speed without being affected by control delay and it is only possible to follow lane discipline. Estimation of FFS is important in several applications. FFS varies extensively across various road facilities as they are influenced by driver behavior, lane discipline, vehicle characteristics, road factors, land use, geometric features, control factors, etc. (Srijith et al., 2015)

The lane utilization is affected by several factors such as vehicle composition, traffic flow rate and vehicular speeds and lane discipline eight hours of video graphic data was collected from a road stretch incorporating both peak and off peak hours. The lane discipline behavior is studied for five different vehicle categories. SPSS software is used for multivariate analysis in connection with lane utilization factor over a wider range of traffic flow rates and structural equation model has been established for all the four lanes separately and the influence of the vehicles on lane discipline. The form of lane utilization and lane discipline behavior by different vehicle types may help in differentiating the characteristics of traffic on expressways. It may be helpful to refine the microscopic simulation models and its parameters in to validate. (Shriniwas et al., 2010)

3. SUMMARY OF LITERATURE REVIEW:

Many methods have been used to estimate the average delay, speed and density relationship using green shied model, lateral Movement, lateral gap, and lateral acceleration at different parameters influencing the flow with lane discipline it can be complex but most have used software simulation techniques and it is uncomplicated and convenient. Most of the studies conducted are for homogeneous traffic situation which concern with lane discipline. Urban Indian circumstances are moreover represented by Heterogeneous traffic flow conditions and different road conditions making it more difficult to correctly estimate the traffic Characteristics at major city road network on behalf of influence by lane discipline. Moreover lane discipline accommodate with Software like VISSIM, IRFANVIEW, ETC. for better understanding of lane discipline at signalized intersection, crossing and Major city road network should be precious in urban traffic area.

4. CONCLUSION:

Lane discipline rule is learned and obeyed by all motorists, and then carry significant volumes of traffic. However, if only a few of vehicles using lane roads don't understand lane discipline. There are chances of accidents, reduction in capacity, and increase in travel time and delay thus influencing the flow behavior. It will also influence comfort and convenience of driving. Occurrence of such phenomenon of breakage of lane discipline under urban Indian scenario with heterogeneous traffic conditions prevailing is detrimental. Hence study on such behavior and measures to prevent should be included in the planning and design procedures to arrive at a suitable solution for the problem and if it exists.

REFERENCES

-Geetimukta Mahapatra, Akhilesh Kumar Maurya, 2016, Study of vehicles lateral movement in non-lane discipline traffic stream on a straight road, 2nd conference on transportation research board-CGT(2013)

- C. Mallikarjun, Budde Tharun, Dibyendu Pal, Analysis of the Lateral Gap Maintaining Behavior of Vehicles in Heterogeneous Traffic Stream, 2nd Conference of Transportation Research Group of India (2nd CTRG)

-Syed Omar, Ch. Mallikarjuna, Analysis of the Macroscopic Relations for No-Lane Based Heterogeneous Traffic Stream, Sustainable Development of Civil, Urban and Transportation Engineering Conference (2016)

-Alireza Talebpour , Hani S. Mahmassani , Samer H. Hamdar , Modeling Lane-Changing Behavior in a Connected Environment: A Game Theory Approach, 21st International Symposium on Transportation and Traffic Theory (2015)

-Srijith Balakrishnan, R. Sivanandan, Influence of lane and vehicle subclass on free-flow speeds for urban roads in heterogeneous traffic, 18th Euro Working Group on Transportation, EWGT 2015, 14-16 July 2015, Delft, The Netherlands

-Sagar Kurle, Krishna N. S. Behara, Rajendra Prasad, Shriniwas Arkatkar, Ashoke Kumar Sarkar, Study of Lane Utilization on Delhi-Gurgaon Expressway (2010)

-Mahendrakumar Metkari, Anuj Budhkar, Akhilesh Kumar Maurya, Development of Simulation Model for Heterogeneous Traffic with Lane Discipline, 2nd Conference of Transportation Research Group of India (2016)